

What is claimed is:

1. A fiber-reinforced flexible composite membrane having two compositionally distinct opposing faces, the membrane comprising:

a fibrous reinforcement;

a perfluoropolymer material coating on each side of the reinforcement, the perfluoropolymer in a balanced state having mechanical forces within the perfluoropolymer equal on each side of the reinforcement to prevent the membrane from curling; and

an elastomer disposed over the perfluoropolymer material on one side of the reinforcement.

2. A fiber-reinforced flexible composite membrane according to claim 1, wherein the elastomer comprises a silicone rubber.

3. A fiber-reinforced flexible composite membrane according to claim 1, wherein the perfluoropolymer comprises PTFE.

4. A fiber-reinforced flexible composite membrane according to claim 1, wherein the perfluoropolymer comprises PTFE and the elastomer comprises silicone rubber.

5. A fiber-reinforced flexible composite membrane according to claim 4, wherein the reinforcement comprise a glass fiber.

6. A fiber-reinforced flexible composite membrane according to claim 1, wherein the perfluoropolymer material is applied in equal amounts to each face of the reinforcement.

7. A fiber-reinforced flexible composite membrane according to claim 2, wherein the silicone rubber is derived from an addition-cure, 100 percent solids, liquid silicone rubber composition.

8. A fiber-reinforced flexible composite membrane according to claim 7, wherein the liquid silicone rubber comprises one or more pigments.

9. A fiber-reinforced flexible composite membrane according to claim 7, wherein in the liquid silicone rubber comprises an organic peroxide catalyst.

10. A method for producing the fiber-reinforced flexible composite membrane of claim 1, comprising

a) coating a woven reinforcement able to tolerate perfluoropolymer processing temperatures with the perfluoropolymer and fusing the perfluoropolymer to a woven reinforcement to obtain a balanced perfluoropolymer/woven reinforcement composite;

b) rendering one face of the perfluoropolymer/woven reinforcement composite bondable to an elastomer;

c) coating the bondable face of the perfluoropolymer/woven reinforcement composite with a low viscosity, platinum catalyzed, addition cure, solventless liquid silicone rubber elastomer; and

d) curing the liquid silicone rubber into a solid rubber.

11. The method of claim 10, wherein the liquid silicone rubber comprises two components, one component containing a catalyst and the other component containing a crosslinking agent and an inhibitor.

12. The method of claim 11, wherein the two components comprise vinyl-terminated polydimethylsiloxane.

13. The method of claim 12, wherein the two components further comprise fumed silica.

14. The method of claim 11, wherein the two components are mixed in a ratio of 1:1.

15. The method of claim 11, wherein the two components are mixed in a ratio of 10:1.

16. The method of claim 11, wherein the perfluoropolymer is applied in equal amounts to both faces of the woven reinforcement.

17. The method of claim 10, wherein the woven reinforcement is fiberglass or aramid.

18. The method of claim 11, wherein one face of the perfluoropolymer/woven reinforcement composite is rendered bondable by coating said one face with a mixture of a colloidal silica dispersion and a perfluorinated copolymer resin dispersion.

19. The method of claim 11, wherein one face of the perfluoropolymer/woven reinforcement composite is rendered bondable by treatment with a solution of sodium, naphthalene and glycol ether.

20. A conveyor belt comprising a fiber-reinforced flexible composite according to any one of claims 1-9.

21. A non-curling reinforced membrane with compositionally distinct opposed faces, the composite comprising:

a glass reinforced fabric layer having two opposed faces;

a PTFE coating applied to the fabric layer on both faces, the coating in a balanced state having mechanical forces within the PTFE equal on each side of the reinforcement to prevent the membrane from curling; and

a layer of silicone rubber applied to one of said opposed faces previously coated with PTFE.